

RAMAKRISHNA MISSION VIDYAMANDIRA

(Residential Autonomous College affiliated to University of Calcutta)

B.A./B.Sc. FIRST SEMESTER EXAMINATION, DECEMBER 2019

FIRST YEAR (BATCH 2019-22)

CHEMISTRY (General)

Paper : I

Date : 16/12/2019

Time : 11 am – 1 pm

Full Marks : 50

[Use a separate Answer Book for each Group]

Group – A

Unit-I

Answer any one question:

[1×10]

1. a) Write short notes on following:

[3 × 2]

- (i) E₁ elimination
- (ii) Hoffmann elimination
- (iii) S_N2 reaction

b) Draw the Fischer projection formulae of meso and active forms of 2,3-dibromobutane. [2]

c) Which one in each of the following pair is more nucleophilic and why? [1 × 2]

- (i) RO⁻ and RCOO⁻
- (ii) NH₃ and H₂O

2. a) Define the terms with examples: enantiomer and diastereomer. [2]

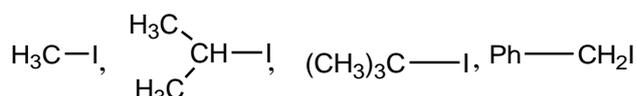
b) Write the product of the following reaction with detailed mechanism. [3]



c) Define the following terms with example of each [2×1.5]

- i) Plane of symmetry
- ii) Alternative axis of symmetry

d) Arrange the following molecules in increase order of S_N1 reactivity with reasons. [2]

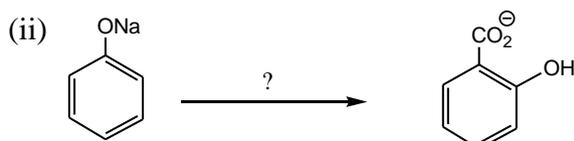
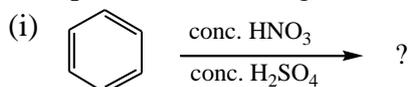


Unit-II

Answer any one question:

[1×10]

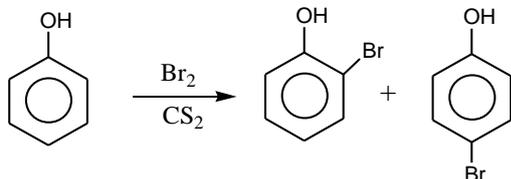
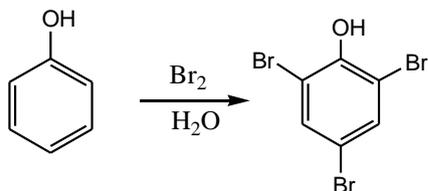
3. a) Complete the following reactions with mechanism: [2 × 2]



b) Write the demerits of Friedel-Craft's alkylation and also describe the advantages of Friedel-Craft's acylation for the preparation of n-propyl benzene. [2+2]

c) Give one suitable reaction to prepare 1° amine. [2]

4. a) Explain the following product formation with reasons. [2]



- b) Give the chemical reactions for identification of 1^o, 2^o and 3^o amines. [3]
 c) Write the mechanism for preparation of salicylaldehyde from phenol. [3]
 d) Between ortho nitrophenol and para nitrophenol which one is more acidic and why? [2]

Group – B

Unit-I

Answer any one question:

[1×10]

5. a) Write the shapes of the following compounds on the basis of VSEPR theory. [3]
 (i) SF₆
 (ii) H₂O
 (iii) PCl₅
- b) Using Born-Haber cycle, find out the lattice energy of CaF₂ from the following data – [3]
 Sublimation energy of Calcium - 201
 First ionisation potential of Calcium = 590
 Second ionisation potential of Calcium = 1145
 Dissociation energy of fluorine = 159
 Electron affinity of fluorine = - 335
 Heat of formation of CaF₂ - 1243
 (all the values are in kJmole⁻¹)
- c) MgSO₄ is water soluble while BaSO₄ is water insoluble, explain with reasons. [2]
 d) Write notes on Fajan's rule. [2]
6. a) State radius ratio rule and mention its limitations. [3]
 b) Explain: [2+2]
 (i) The melting point of NaCl is higher than that of AlCl₃.
 (ii) Melting point decreases from CaF₂ to CaI₂.
 c) Predict the shapes of the following using VSEPR - theory: [1 × 3]
 (i) I₃⁻, XeF₄, NF₃

Unit-II

Answer any one question:

[1×10]

7. a) Draw the approximate MO energy level diagram for N₂ molecule. Compare the bond dissociation energies of N₂⁺ and N₂⁻ and explain the difference. [2+2]
 b) Give a brief introduction of Werner theory (postulates) regarding coordination complex. [3]

- c) What are polydentate and flexidentate ligands? Give example. [3]
8. a) Draw the qualitative MO diagram of HF molecule and comments on its bond polarity and bond order. [2+2]
- b) Write the IUPAC nomenclature of $[\text{Co}(\text{NH}_3)_6][\text{Cr}(\text{CN})_6]$. [2]
- c) How will you distinguish between: [2]
 $[\text{Co}(\text{NH}_3)_5\text{Br}]\text{SO}_4$ and $[\text{Co}(\text{NH}_3)_5\text{SO}_4]\text{Br}$
- d) What is innermetallic complex? Give one example. [2]

Unit-III

Answer any one question:

- [1×10]
9. a) Discuss the preparation and structure of diborane. [3]
- b) Compare and contrast the properties of Boron and Aluminium considering the points: [2]
 (i) Oxides (ii) Halides
- c) Write a note on Inert pair effect. [2]
- d) Show that Hydrozine has both oxidising and reducing properties. [3]
10. a) Give the preparation and two uses of any two of the following: [2×3]
 (i) Hydroxylamine
 (ii) Interhalogen
 (iii) sodium thiosulphate
- b) Compare NH_3 , PH_3 and AsH_3 with respect to (i) Basic strength (ii) Reducing properties. [2]
- c) How hydroxylamine is prepared? [2]

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